

IN THE DRAWING

Please amend the Figs. 1 to 5 as the attached amended copy. In the amendment of the figure, the figures 1 to 3 are added with "Prior Art" and Figs. 4 and 5 are added with numerals 241, 241, 251, 252. No other portion is amended. Thereby, no new matter is added.

REMARKS

Very thanks for Examination's suggestion and thanks for finding some citations about the present invention, thereby, the applicant may know more information about the invention. This case has been carefully reviewed and analyzed in view of the office action. All details of the reference prior arts are fully considered and compared with the present invention.

ABOUT THE REJECTION SPECIFICATION

Responsive to the objections and rejections made of the Examiner in office action. We have amended the specification, claims and abstracts. All the errors disclosed in that office action has been corrected according to the Examiner's indications disclosed in the official action.

ABOUT THE REJECTION OF DRAWINGS

Figs. 1 to 5 are amended as the attached amended copy. In the amendment of the figure, the figures 1 to 3 are added with "Prior Art" and Figs. 4 and 5 are added with numerals 241, 241, 251, 252. No other portion is amended. Thereby, no new matter is added

In the amendment, the teeth of the first, second and third gears are indicated 24, 241, 242 instead of the original 24. The recesses 25 for the first, second and third gears are indicated as 25, 251, 252 so that the confusions in the indications of teeth and recess are resolved.

ABOUT CLAIM REJECTION OF 35USC103

Indeed the citations disclose some features of the present invention, and the applicant agrees with these viewpoints, however applicant discovers that some main features of the present invention are not disclosed in the citation

which can form the novelty and inventive step of the present invention.

To illustrate the novelty of the present invention and overcome the objection from the citations, the applicant decides to amend claim 1 as the following. The claim 2 is remained in the original state. The amendment of claim 1 is based on the original claim 1 and the Figs. 4 and 5. Thereby, it is assured that the new claims are based on the original claim and specification and thus no new matter is added. The relation of the new claims with respect to the original claims are shown in the following.

CLAIMS SHOW CHANGES AND NUMERALS FOR DISCUSSING IN THE REMARK

Claim 1. (Currently Amended) An integrally formed gear set with a plurality of gears comprising a first gear 21, a second gear 22 and a third gear 23; each of the first gear 21, second gear 22 and third gear 23 being formed with a plurality of teeth 24, 241, 242 and a plurality of recess portions 25; a diameter of the second gear 22 being smaller than that of the first gear 21 and the diameter of the third gear 23 being smaller than that of the second gear 22; the teeth 24 and recess portions 25 being alternatively arranged; each gear surface of the second gear 22 and third gear 23 being vertically extended with protruding rings; an outer side of each the protruding ring having a plurality of protruding sheets 26 which are vertical to a plurality of one of surfaces of the first gear 21 and the second gear 22; a concave portion 27 is formed between two adjacent protruding sheets 26 being formed by a plurality of connecting sheets 26 and a plurality of concave portions 27; each protruding connecting sheet 26 being vertically extended from a respective recess portion 25; the concave portion 27 being between two adjacent recess portions 25; the third gear 23 having an assembling

hole 230 at a center thereof for assembling with a rod; and

wherein the first, second and third gears are formed integrally.

~~wherein the first, second and third gears 21, 22, and 23 are formed by a sheet, initially, the sheet is plane and then is formed as a stepped structure containing three layers which are then formed the first gear, second gear and third gears; the rings between two gears are stripped with a plurality of teeth which are bent to be at the same plane of the second and third gears; the portions of the rings un-stripped are remained as the concave portions.~~

Claim 2. (Original) The integrally formed gear set with a plurality of gears as claimed in claim 1, wherein other gear is further protruded from the gear set so that the number of gear is more than three.

DISCUSSION ABOUT THE NOVELTY THE PRESENT INVENTION

each gear surface of the second gear 22 and third gear 23 being vertically

(A) For the citation USP 4,380,445

(1) The first feature of the present invention is that:

~~each gear surface of the second gear 22 and third gear 23 being vertically extended with protruding rings;~~

See Figs. 2, 4, and 7 of the citation '445, it is illustrated that the rings between gear surfaces 1, 2, 3 is not vertical to the gear surfaces 1, 2 and 3. It should be noted that in Fig. 6, the indications 8, 9 are spacers instead of the rings of the present invention.

(2) In the amended claim 1, we have clearly defined the protruding sheets as the following:

~~"an outer side of each the protruding ring having a plurality of protruding~~

sheets 26 which are vertical to a plurality of one of surfaces of the first gear 21 and the second gear 22, a concave portion 27 is formed between two adjacent protruding sheets 26

Thus the confusion about the claims disclosed in the office action can be resolved by above definition.

However see Fig. 5 of the citation '445, it is illustrated that the surfaces between the gears 1, 2, 3 are smooth surfaces without protruding sheets.

(3) In the present invention, the first, second and third gears are formed integrally.

However the citation '445 does not disclose that the gear set can be integral formed.

(B) For the citation EP047927,

The citation disclosed a gear set for a bicycle comprising three and more gears such that each descending gear has a smaller diameter than a previous gear. However the citation '927 still has no the function disclosed above (1) to (3)

Thus, the citation '927 and '445 still has the features in above (1) and (3)

(C) RESULT

Since in above discussion, it is apparent that no prior art has the features of the present invention, especially in new claim 8. Furthermore, as we know that no other prior art has features of the present invention. Thus, the present invention is novel and inventive.

If there is any error in the specification, or claims, applicant requests and authorizes Examiner to amend the claims, specification and drawings

of the present invention so that they can match the requirement of U. S. Patent. Attentions of Examiner to this matter are greatly appreciated.

It is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

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"MARK-UP" COPY OF THE AMENDED SPECIFICATION

INTEGRALLY FORMED GEAR SET WITH A plurality of GEARS

Field of the invention

The present invention relates to gear sets, and particular to an integrally formed gear set with a plurality of gears.

Background of the invention

The prior art gear sets are used in bicycle. Figs. 1, 2, and 3 shows a prior art structure. The gear set 10 includes a first gear 11, a second gear 12, and a third gear 13. Each gear 11, 12 and 13 is punched with a plurality of teeth 24, a plurality of recess portions 25 and a plurality of rivet holes 16. Then sleeves 17 and rivets 18 serve to rivet the first, second and third gears 11, 12 and 13. The first gear 11 has a via hole 110 and the second gear 12 has an assembled hole 120 for assembling the treading sheet 19 of the pedal. The prior art has the following disadvantages. (1) Each gear is formed individually and then the sleeves 17 and rivets 18 are assembled. The assembled work is tedious and complicated so that the cost is high. The combination of sleeves 17 and rivets are loose so that after a long time, the gears will loose. The connection of rivets 18 are point connections so that the combination of gears is not firmly. Gaps are formed between gears so that a released chain will fall into the gap. All the actions are applied upon the teeth 14 and the concave portions 15. The gear is easily worn.

Summary of the invention

Accordingly, the primary object of the present invention is to provide an integrally formed gear set with a plurality of gears comprises a first, a second and a third gear. Each gear has a plurality of teeth and a plurality of recess portions. The teeth and recess portions are alternatively arranged. The first, second and third gears are formed by a sheet which is firstly formed as a stepped structure containing three layers which are the first gear, second gear and third gears. The rings between two gears are stripped with a plurality of teeth which are bent to be at the same plane of the second and third gears. The portions of the rings un-stripped are remained as concave portions.

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of the prior art.

Fig. 2 is an assembled perspective view of the prior art.

Fig. 3 is an assembled cross section view of the prior art.

Fig. 4 is a perspective view of the present invention.

Fig. 5 is a cross section view showing that the present invention is assembled with a treadle and a chain.

DETAILED DESCRIPTION OF THE INVENTION

In order that those skilled in the art can further understand the present invention, a description will be described in the following in details. However, these descriptions and the appended drawings are only used to cause those skilled in the art to understand the objects, features, and

characteristics of the present invention, but not to be used to confine the scope and spirit of the present invention defined in the appended claims.

With reference to Figs. 4, and 5, a gear set 20 of the present invention includes a first gear 21, a second gear 22 and a third gear 23. Each of the first gear 21, second gear 22 and third gear 23 is formed with a plurality of teeth 24, 241, 242 and a plurality of recess portions 25, 251, 252. The diameter of the second gear 22 is smaller than that of the first gear 21 and the diameter of the third gear 23 is smaller than that of the second gear 22.

The teeth 24, 241, 242 and recess portions 25, 251, 252 are alternatively arranged. Each gear surface of the second gear 22 and third gear 23 is vertically extended with protruding rings. An outer side of each The protruding ring has is—formed by a plurality of protruding connecting sheets 26 and a plurality of concave portions 27 are formed between the plurality of protruding sheets 26. Each protruding connecting sheet 26 is vertically extended from a respective recess portion 25, 251, 252. The concave portion 27 is between two adjacent two recess portions 25, 251, 252. The third gear 23 has an assembling hole 230 at a center thereof.

The first, second and third gears are formed by a sheet which is firstly formed as a stepped structure containing three layers which are the first gear 21, second gear 22 and third gears 23. The rings between two gears are stripped with a plurality of teeth 24, 241, 242 which are bent to be at the same plane of the second and third gears 22 and 23. The portions of the rings un-stripped are remained as the concave portions 27.

In the present invention, the assembling hole 230 serves to assembly a rod (for example, a pedal rod of a bicycle).

In manufacturing of the present invention, the punching and forging manufacturing process can be used. A sheet is firstly punched (or forged) to has a three layer stepped structure including a first, a second and a third layers. Then, the rings between two gears are formed stripped with a

plurality of teeth 24 which are bent to be at the same plane of the second and third gears 22 and 23. ~~The portions of the rings un-stripped are remained as the concave portions 27.~~ Thereby, the three gears 21, 22 and 23 are formed as an integrally structure.

Other than manufacturing by punching and forging, other manufacturing process is allowable. For example, the present invention is made by molding.

In above embodiment, the structure of the present invention has three layers, however, the same structure with layers with numbers other than 3 can be used, such as two or four gears are formed at the structure integrally. Advantages of the present invention will be described herein. Firstly, since the gears 21, 22 and 23 are formed integrally so that the connection is very firmly and thus the structure is strong. It is difficult to deform the gear set of the present invention. Secondly, when a chain 28 is engaged to the gear set 20 of the present invention, since one lateral edge of the chain 28 is in contact with the rings between two gears, some force of the chain is applied to the protruding connecting sheets 26 so that the protruding sheets teeth 26 and the concave portions 27 are uneasy to wear. When the chain 28 is released, it will be hindered by the protruding connecting sheets 26. Thereby, the chain 28 can be taken out easily. Furthermore, the gears 21, 22 and 23 are formed integrally so that it is impossible that any one of the gears 21, 22 and 23 shifts or displaces.

The present invention is thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

ABSTRACT

An integrally formed gear set with a plurality of gears comprises a first, a second and a third gear. Each gear has a plurality of teeth and a plurality of recess portions. The teeth and recess portions are alternatively arranged. The first, second and third gears are formed by a sheet which is firstly formed as a stepped structure containing three layers which are the first gear, second gear and third gears; the rings between two gears are formed stripped with a plurality of teeth which are bent to be at the same plane of the second and third gears. ~~The portions of the rings un-stripped are remained as concave portions.~~

Annotated Marked-up Drawings

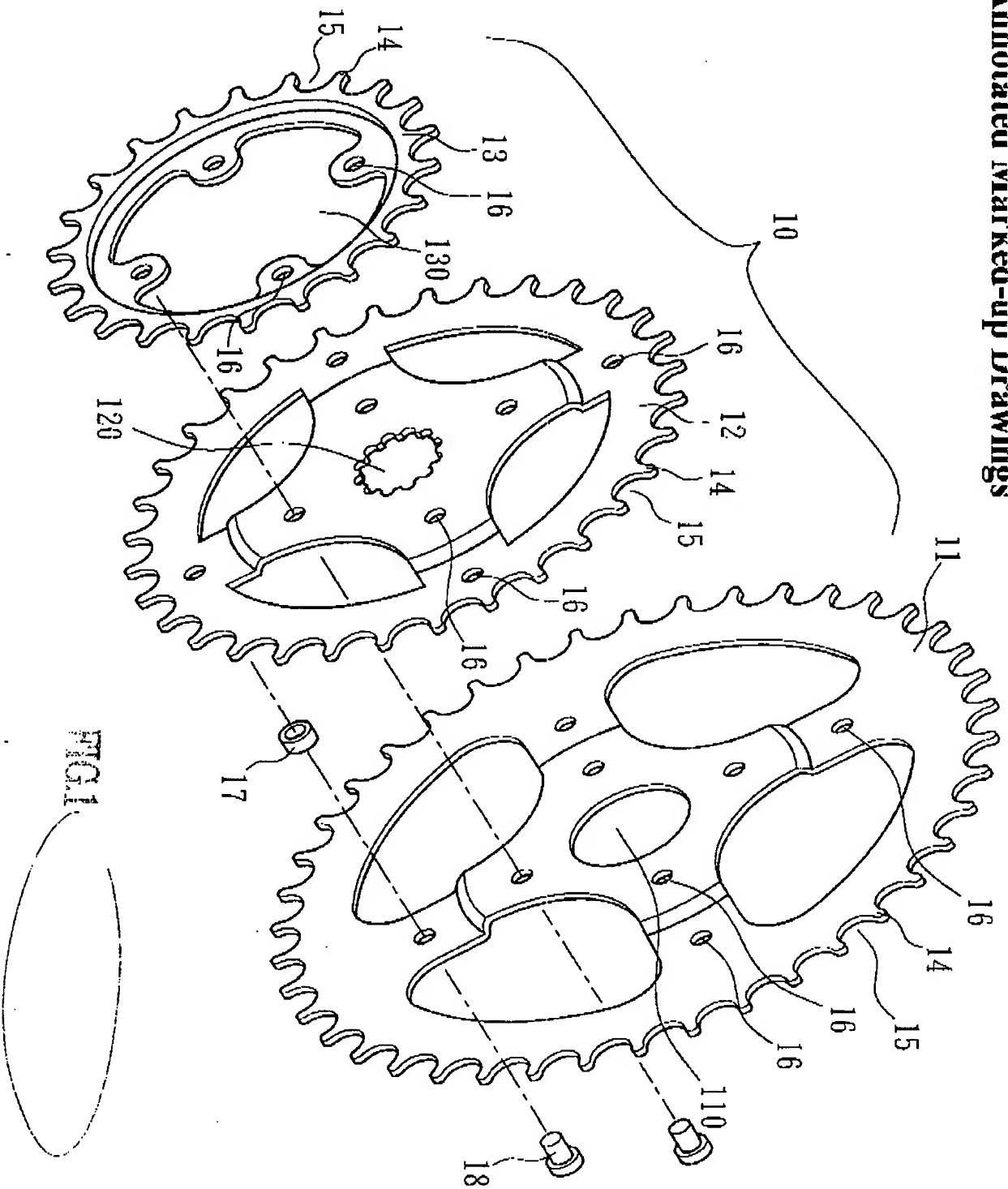


FIG. 1

Annotated Marked-up Drawings

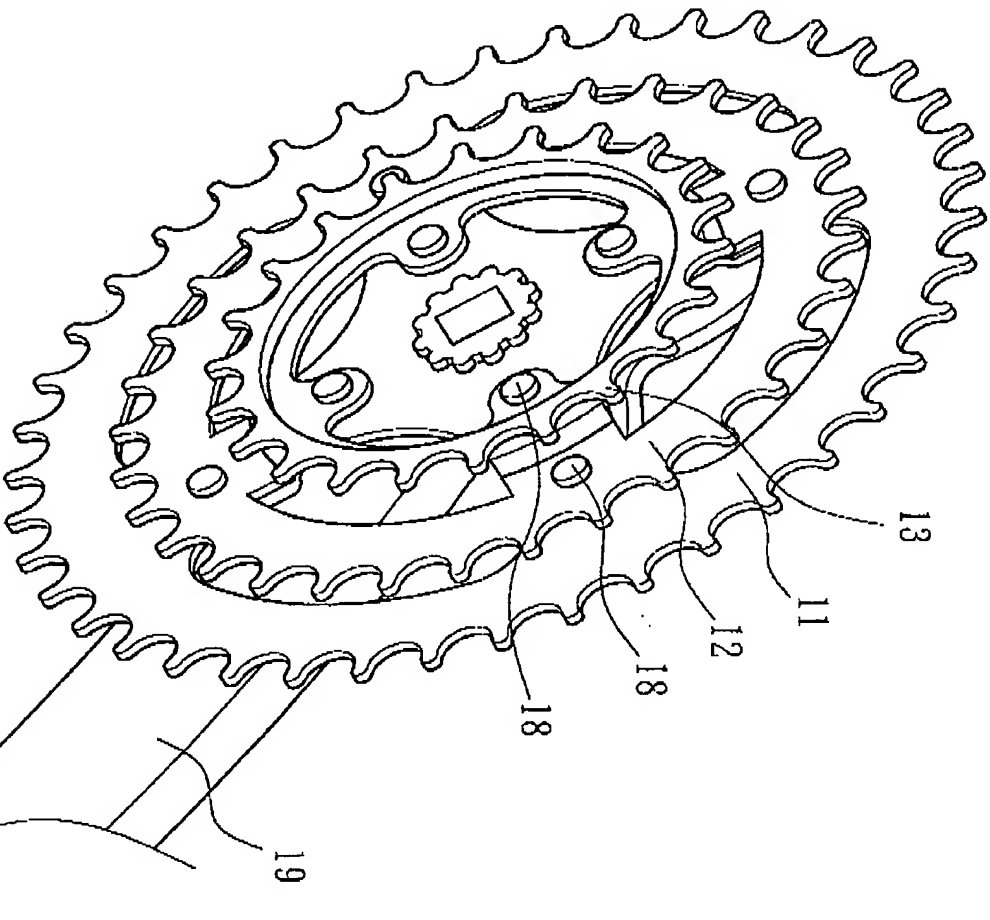
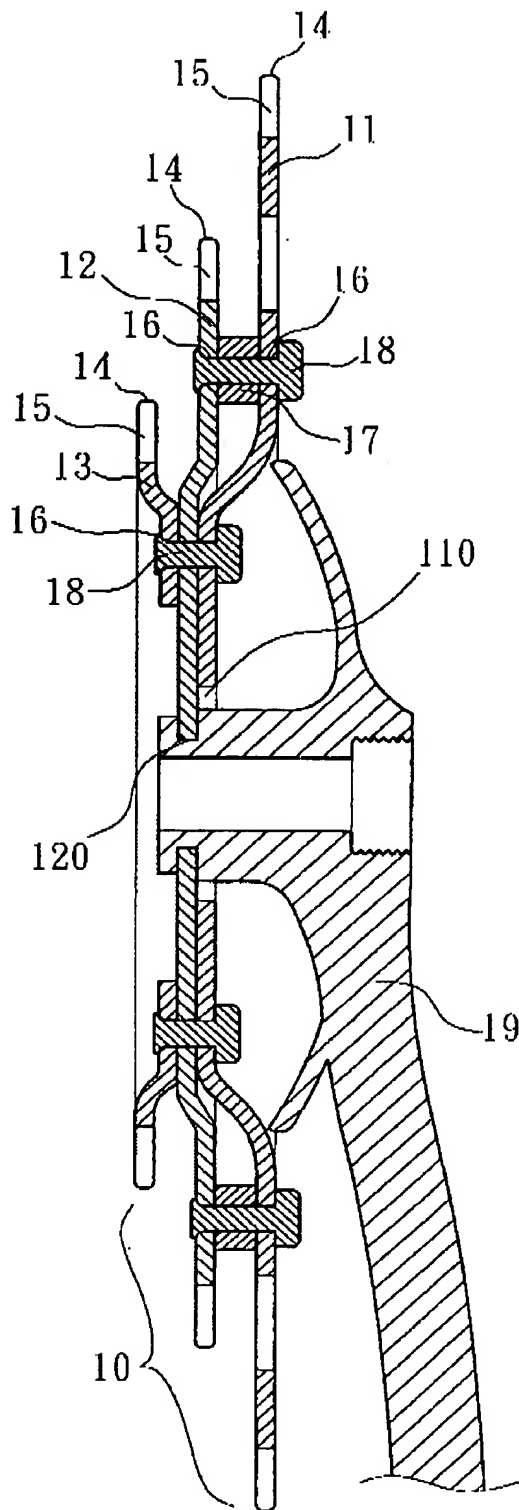


FIG. 2

tated Marked-up Drawings



Annotated Marked-up Drawings

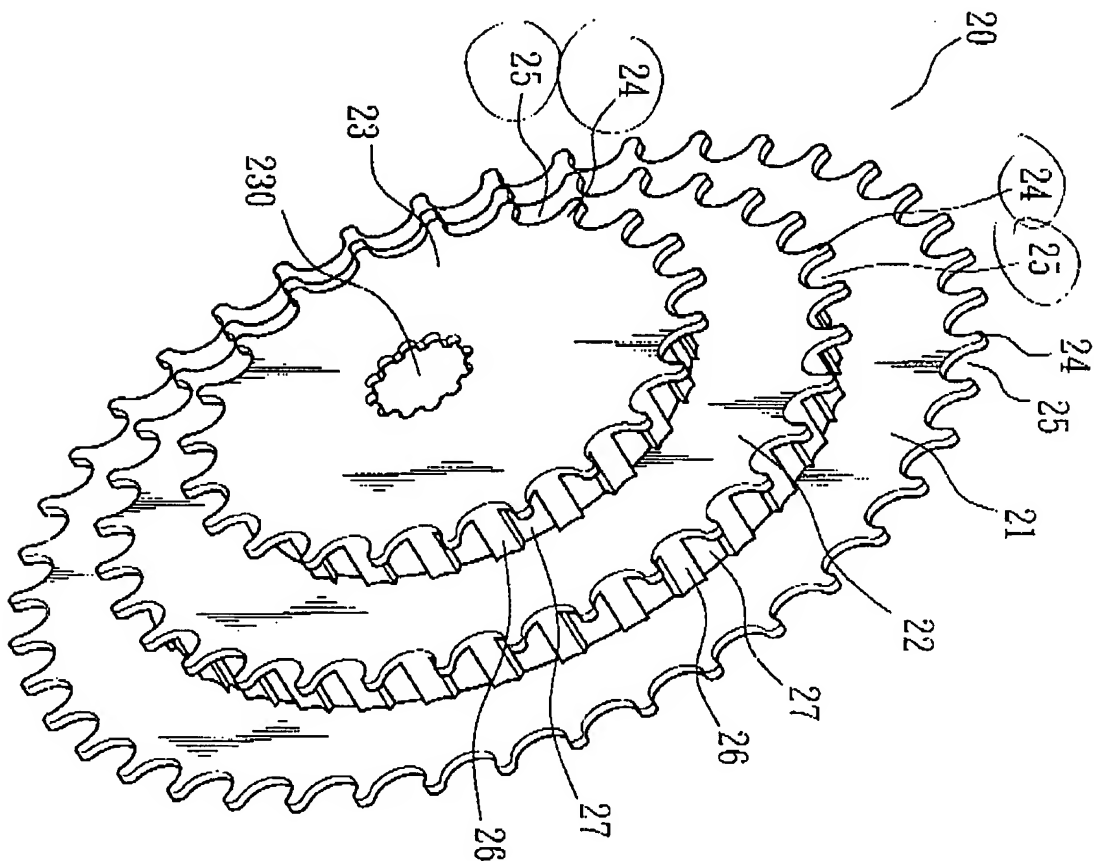


FIG. 4

Annotated Marked-up Drawings

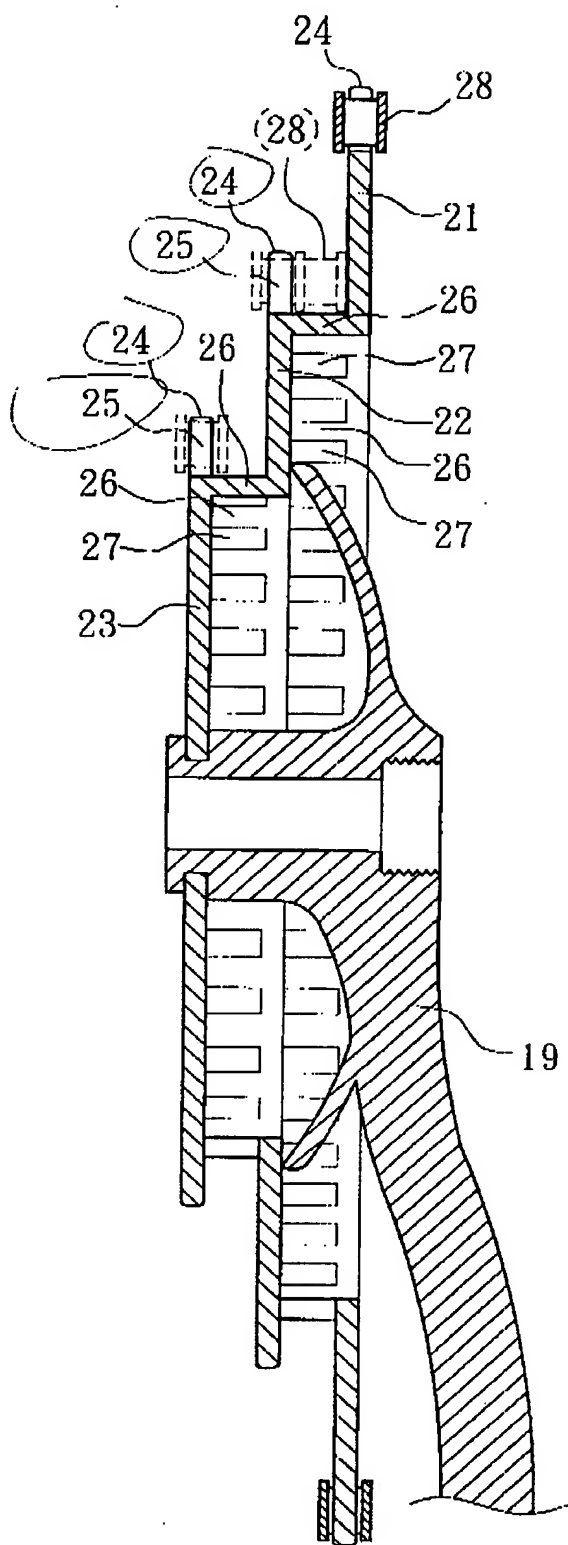


FIG. 5